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ABSTRACT

Product development procedures used by Doubleday Multimedia in the development of instructional materials are enumerated and explained. The terms "learner verification" and "formative evaluation" are classified. Different methods and procedures of product improvement are demonstrated, and sample procedures and evaluation forms are suggested for producers of instructional materials. A list of 25 questions for selecting instructional materials is appended. (SK)

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THE PRODUCT IMPROVEMENT PROCESS

Phyllis W. Dole
Executive Editor, Doubleday Multimedia
January 13, 1975

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First we shall clarify the terms "learner verification" and "formative evaluation during product development" as used in this paper, in order that we mutually understand the discussion. Then I shall present sample models of product development procedures I have used for some materials developed at Doubleday Multimedia. Third, it should be emphasized that the sample model programs presented do not necessarily represent the procedures exercised by other producers, but are samples for this discussion.

Discussion will be directed to the variety of audiovisual products and the variety of product development procedures. Because of the different designs and formats of audiovisual materials there are different kinds of challenges to trial testing and evaluating materials, since their content, instructional objectives and format--i.e. cassette, record, 16 mm film, filmstrip, transparencies--present different possibilities for assessment. Sample trial test models which have been used in some of our products will be presented as a basis for consideration. Lastly, there are several evaluation forms listing points to be considered by producers of instructional materials. These evaluation forms might also be used by purchasers as they list various criteria by which materials may be judged.

Now let's discuss the terms verification, validation and evaluation, which are frequently used interchangeably in journal articles, newsletters, seminars and state statutes.

Learner verification, as a categorizing term, was probably first proposed in 1971 when staff members of EPIE testified before the Select Subcommittee on Education and Labor of the U.S. Congress.

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Learner verification is not a means of certifying that the instructional materials, once and for all, are an absolute means for students' learning the instructional objectives of the material. What learner verification is intended to direct is that producers of educational products verify products with learners prior to entering the instructional material in the school market. Further, that instructional materials be adjusted or revised to meet new needs and changing conditions as feedback from users is collected.

Learner verification is a means of developing, improving and maintaining quality. It also suggests that producers securing the data and information by testing out products with learners then have supportive evidence from which they may make responsible statements about what their products will or will not do under what particular instructional conditions and with described target audiences (the kinds of learners). To quote from an Epigram from February 1, 1974: Factual claims of performance, product improvement, effectiveness, quality and durability and competitive comparisons in consumer advertising should be based on reasonable test information related to conditions of normal consumer use. Now in order to gather this support data to evidence that an instructional product has been tested out with students, we come to the processes of evaluation and validation; and there are some differences.

Evaluation can be in the simple form of a questionnaire. There can be a list of criteria to guide evaluators through the content and quality of the instructional product.

Validation, however, as used in the technical sense of statistical analysis, presents different interpretations, different levels of sophistication. Producers have and use a variety of procedures to insure the quality of the materials and their effectiveness in use. First, they draw extensively on the expertise of the author or consultant or designer of the material. These individuals have teaching experience, knowledge of the field, and other relevant experience. In addition to the verification of the quality of the

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material on the basis of expert opinion, producers also field test their materials with students in a variety of school settings, and sometimes establish try-outs over extensive periods of time, possibly a school semester.

One of the initial steps in the development of programs is the selection of authors, consultants, editors and reviewers whose credentials can be supported, who have extensive education in the field and relevant experience with students. In addition, these experts may have published work; however, this criterion is not exclusive, as the individual may not have published yet still have had recognized success in the content area.

The next step beyond the concept of the program itself and the expertise of the designer is search into the related research, theoretical rationale, and supporting evidence that the proposed program or design will be successful.

Following this, there must be clearly stated instructional objectives, which in terms of cognitive content is not too difficult to do. For example, if one designs a maps and globes program, the content can be precisely identified. But if the content of the proposed program deals primarily with the affective domain, aesthetic experience, motivational material, values and attitudes, it is more difficult to identify precise objectives.

In addition to having confirmed 'experts' to write and design the program, statements of rationale, a search into research, and clearly stated instructional objectives, instructional programs should have correspondence to curriculum practices. This indicates search into school district guidelines, state guidelines, scope and sequence published both by curriculum committees and scope and sequence of basal developmental programs. In some cases, particularly that of forerunners, the correspondence to existing curriculum may not be possible. One of the advantages of audiovisual instructional materials is that producers can respond in a reasonable amount of

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time to the needs of schools. For this reason, the interface (communication) between the schools and publishers, where the educators indicate that materials are needed for some specific instructional objectives, is very important. An example of this might be a product on the feminist movement, where there might not be formal curriculum, but teachers are looking for instructional materials to enhance their programs.

In today's schools, there is a definite shift from teaching to learning, that is, 'input' of course content is not the only criterion for judging instructional materials. There is also concern for 'outcomes,' or what the learner carries away after his learning experience.

In verifying learning, which may be done in pre and post-testing, we validate the content learning. However, this is an oversimplification because it suggests that learning materials alone can guarantee specific achievement on the part of pupils. All of us are aware that many other parameters must be taken into consideration when evaluating learning: the nature of the students; the entry achievement levels; the conditions of the classroom; the outside influences on learning; the quality and preparation of the teachers themselves; and the ways in which the materials are used. Neither research nor experience supports the assumption that learning materials can be the sole determinant of pupil performance.

One of the concerns of publishers of instructional products is the effective use of the materials. We may assume responsibility for the developing of materials that can be proved effective with described target learners when used appropriately for the purpose for which the materials are created. Again, when we attempt to measure affective outcomes, we all recognize that teacher attitudes toward materials may be vital in determining how effective the materials are.

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Purchasers can expect producers to have information available on how products have been designed, developed, tested and revised. Purchasers can expect producers to indicate how materials may be used, to indicate the types of learners that have had success with the material, and the entry level or prerequisite skills learners must have to be successful. However, although controlled pilot studies and pre and post-testing may yield information on the success of a program, one cannot always extrapolate that indeed all students in all school situations would have equal success with the given instructional material.

The schools can very effectively help in the process of improving the quality and use of learning materials by making it possible for trial testing to be conducted and by providing actual manpower and time for the assessment of students. This paper does not permit an extensive discussion of the cost factors for product improvement. Producers of instructional materials pay sizeable royalties to authors. In addition to the investment for editorial staff, program design, production cost and so on, extensive field testing and comprehensive reports increase the cost of materials. Consequently, this cost factor affects the price of materials, and it causes a particularly frustrating problem at this time when school funds for instructional materials are very limited. Widespread and continuous validation of instructional materials with quick response revisions would indeed substantially increase overall costs of learning materials to the schools.

The educational materials business is highly competitive and in a sense is an ultimate guarantee that publishers will continue to produce higher and higher quality of materials. Excellence is required and materials are more carefully scrutinized by the purchasers than a decade ago.

Let's turn our attention now to a brief outline of instructional product planning from the developmental stage through product

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preparation to product formative evaluation. Formative evaluation is the place where the developed first draft materials are field tested with individuals or small groups of learners and on the basis of the assessed learners' performances on pre and post-tests, data is gathered on the effectiveness of the product in terms of the instructional objectives. After such assessment, the product is revised and finally released for the market.

Describing these procedures may seem redundant to producers, but consumers may not be aware of the steps the producer takes to develop a good instructional product.

At this point I would like to refer you to a chart which shows the steps taken from idea to decision to produce. Other producers may have other ways that they keep records on product flow. By scanning the Product Schedule Form, you will be aware of the very large number of details that are required to have a product ready for market. Now as a model, I would like to use a brief description of a product for middle grade children, called "More Roads to Meaning," that we will release this February. There is also a statement of the overview or purpose of the materials, the specific instructional objectives, and a brief report of the trial testing that was done.

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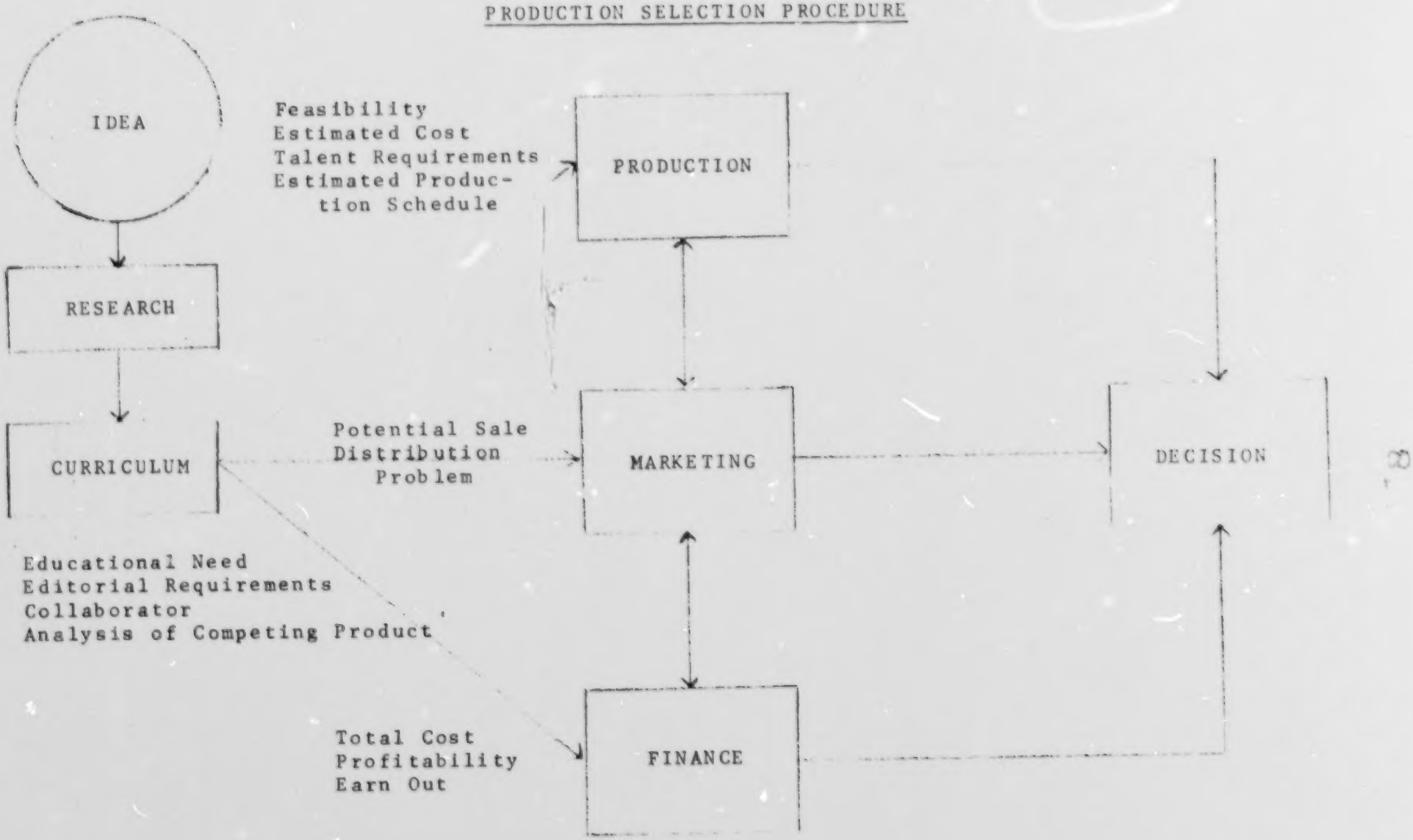
PRODUCTION SELECTION PROCEDURE



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INSTRUCTIONAL PRODUCT PLANNING

I. Developmental Stage:

1. Prepare list of learning objectives stated in terms of outcomes to be acquired by students

2. Specify the program's prerequisite skills which learners must have in order to gain from program - i.e. learning achievement level and target audience

3. Sequence program objectives in correspondence to current curriculum practices and learning theory.

II. Product Preparation:

1. List various components of program and the function of each in relation to the stated objectives: visuals, cassettes, records, printed student materials, teacher's guide, correlated materials

2. Prepare specifications for the development of each component

   a. Program overview

   b. Outlines for each unit of each component

   c. Treatment descriptions.

III. Product Formative Evaluation:

1. Develop first draft materials and procedures for each component and field test with individuals and/or small groups of learners. (Tryout conditions should be as near as possible to those in which the final product would be used.)

2. Assess learners on a program pre-test, measuring performance on each instructional objective

3. Post-test learners' performance on each of the instructional objectives

4. If performance growth is high on all objectives, manufacture product.

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IV. Product Revision:

1. From tryout trial test identify components on which learner performance was low

2. Construct set of revisions based on low performance of learners

3. When possible, pre and post-test revised edition of product.

V. Release Product for Marketing:

1. Document users' comments

2. Correct any noted errors before manufacturing reorders

3. Design revised editions following product formative evaluation procedure.

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STANDARDS FOR PROGRAM DEVELOPMENT AND PROGRAM REVISION

1. Authors, Consultants, Editors, Reviewers
   - Credentials:
     - A. Education
     - B. Relevant experience in field,
       Local and/or national reputation,
       Published works, and/or success in practice.

2. Rationale and Purposes
   - Related to research and theoretical rationale
   - Supporting evidence through use with students

3. Clearly stated instructional objectives

4. Correspondence to current curriculum practices

5. Guidelines for Use
   - Entry level - Target Audience
   - Adaptability to various kinds and levels of learners
   - Step-by-step explanation of use
   - Evaluation for assessing learning outcomes

6. Trial Testing For:
   - Appropriateness to target population
     - Cultural background
     - Developmental levels
     - Special needs
   - Effectiveness for specified purposes

7. School Use
   - Initial cost of program
   - Ongoing cost of program - expendables
   - Cost per pupil
   - Design and durability
   - Fit to school organization
   - Need for in-service training
   - Suitability to teaching schedules

RESEARCH AND DEVELOPMENT - DOUBLEDAY MULTIMEDIA

PRODUCT SCHEDULE FORM

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START DATE _____ SERIES TITLE _____

CONSULTANT _____ NO. IN SERIES _____

PHONE # _____ INDIV. WORKING TITLE _____

WRITER _____ INDIV. FINAL TITLE _____

PHONE # _____ CODE # _____

PRODUCER _____ GRADE LEVEL _____

PHONE # _____ RELEASE DATE _____

PROJECT MANAGER _____

	DATE DUE	ACTUAL DATE	COMMENTS
PROJECT ACCEPTED EDIT. MTG.			
CONSULTANT SELECTED			
PRELIMINARY OVERVIEW ASSIGNED			
PRELIMINARY OVERVIEW RECEIVED			
PRODUCT SELECTION MTG. APPROVAL			
OVERVIEW OUT FOR SALES ESTIMATES			
SALES ESTIMATES IN			
P&L COMPLETED			
P&L APPROVED			
CODE # ASSIGNED			
PRODUCT OUTLINE ASSIGNED			
PRODUCT OUTLINE COMPLETED			
RELEASE DATE SET			
OUTLINE TO ADVERTISING			
SCRIPT ASSIGNED			
SCRIPT APPROVED			
SCRIPT TO ADVERTISING			
STORYBOARD ASSIGNED			
STORYBOARD APPROVED			

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	DATE DUE	ACTUAL DATE	COMMENTS
ASSIGN STUDY GUIDE			
TITLE FINALIZED (WITH MKT.)			
ART COMPLETED			
PHOTOGRAPHY COMPLETED			
STILLS TO ADVERTISING			
TITLES ORDERED			
PICTURES EDITED			
PICTURES TO LAB			
FINAL NARRATION SCRIPT COMPLETED			
FINAL NARR. SCRIPT TO CONSULTANT			
ANSWER PRINT RECEIVED			
ANSWER PRINT APPROVED			
ANSWER PRINT TO CONSULTANT			
NARRATION COMPLETED			
STUDY GUIDE TO ADVERTISING			
SOUND MIX & EDIT COMPLETED			
TEST CASSETTE RECEIVED			
TEST CASSETTE APPROVED			
TEST PRESSING RECEIVED			
TEST PRESSING APPROVED			
LABEL INFO. TO ADVERTISING			
P.I. SHEET TO MARKETING			
APPROVED FOR MFGR. (CRI)			
NICEM FORMS SENT			
NICEM FORMS RECEIVED			
INFO. TO SPEC. SERVICES			
CANADIAN CERT., USIA SENT			
CANADIAN CERT., USIA REC'D			
TO CANADA, SENT			
TO CANADA, RECEIVED			

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	DATE DUE	ACTUAL DATE	COMMENTS
COPYRIGHT APPLICATION			
COPYRIGHT APPROVED			
ADVERTISING APPROVED			
PACKAGING APPROVED			
ON SHELF			

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EVALUATION OF INSTRUCTIONAL MATERIALS

CONTENT

scope
sequence
accuracy
relevance
authorship
recency

PRESENTATION

utility
clarity
appeal
illustrations
adaptability
ease of use
durability

SUPPORTIVE ELEMENTS

teacher guide
pupil consumables
ancillary materials
evaluation
reteaching strategies
research
validation studies

COST

short term
long term
per pupil

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THE SELECTION OF INSTRUCTIONAL MATERIALS

1. The evaluation and selection of instructional materials rests on four categories

   A. The learner population
   B. The teaching staff
   C. The curriculum guidelines/administrative options
   D. The parents/community

2. Instruction is ultimately dependent on who the decision makers are

   A. Learners make decisions largely on their own
   B. Teachers guide learners through content
   C. Curriculum guides, state mandates, etc. provide a wide variety of options or are restrictive
   D. Decisions result from interaction of parents/community and educators, or are made independent of parent involvement

3. The selection of instructional materials depend on the learning outcomes desired

   A. Pschomotor Domain

      Examples: Moving; copying; performing; manipulating; pronouncing; articulating; singing; painting

   B. Cognitive Domain

      Examples: Communicating; writing; memorizing; associating; interpreting; predicting; analyzing; synthesizing; creating; investigating; concluding; thinking divergently

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C. Affective Domain

Examples: Liking; avoiding; rejecting; empathizing; sharing; trusting; enjoying; valuing; rewarding

4. Setting for instruction determines type of instructional materials

A. Learners study by themselves

1. Learners work in small groups
2. Learners study as a class (20-40 students)
3. Learners meet in large groups or assembly 30-300 students in an auditorium

B. Teacher, teacher-assistant is resource person and provides instruction

C. The community, industry or business is the setting for learning

5. Instruction is provided in a variety of ways

A. Learner is provided a careful step-by-step presentation in lecture form
B. Programmed or sequenced material guided by directions, questions, answers
C. Realistic presentation through media-films, etc.
D. Simulated events providing a problem to be solved
E. Learning center source available for exploration and self instruction
F. Educational games

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TWENTY-FIVE QUESTIONS FOR SELECTING INSTRUCTIONAL MATERIALS

1. Are the learning outcomes, Behavioral Objectives, of the producer's material compatible with the school's objectives?
2. Does the organization of instruction in the material follow an identifiable conceptual model?
3. Does the school staff have the professional skills necessary to use the material? If not, what provisions are necessary for teacher training?
4. Does the material provide for individualization of instruction? Are there provisions for learning differences?
5. Can this material be linked to existing programs for instructional continuity? Has a 'needs assessment' been identified? Is there a survey of current materials 'on hand' been studied to determine if the new instructional material will support, supplement or reinforce present curriculum?
6. Is skill instruction provided in suitable sequence?
7. Is the practice of skills and abilities distributed throughout the material, rather than mass practice at one time?
8. Do the materials provide an extension and broadening of the learners' experience?
9. Does the material provide motivational strategies?
10. Is interest stimulated by the design, format, pictures, and other attractive presentations?

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11. Will the learner through use of this material be prepared with appropriate background information to acquire new learning?

12. Are ethnic considerations provided for, so that equitable treatment is assured?

13. Are there many and varied activities for learning the concepts and processes?

14. Can retention be sustained by the amount and distribution of practice and repetition?

15. Are linguistic principles considered and does the instructional structure move from easy to more difficult tasks and concepts?

16. Is the information and instructional content pertinent to the learners' experience and needs?

17. Is the concept level compatible to the learner population for which it is designed?

18. Are the vocabulary controls such that the target population for which the material is designed can use the materials effectively?

19. Does the material employ literary methods to generate humor, excitement, suspense, involvement and new understandings?

20. Are technical terms and/or unfamiliar words explained satisfactorily?

21. Are there explicit instructional suggestions for the teacher?

22. Are additional teaching strategies offered for reteaching and reinforcement?

23. Are the instructional materials related to content in other study areas for transfer and application?

24. Are references or bibliographies included to correlate other materials with this material?

25. Is evaluation of learner progress provided which relates specifically to the skills, processes and concepts taught?

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NEW PRODUCT INFORMATION

Release Date: Februcry, 1975 Copyright Date: February, 1975

Series Title: MORE ROADS TO MEANING

Media Type: Sound Filmstrips

No. of Titles in Series: 6 filmstrips, 6 cassettes, 12 ditto lesson sheets, comprehensive teacher's guide.

Series Price: $93.50

Rights: World

Film Title:	Product Code No.:	Running Time:	Price:
F.S. No. 1 Tables Without Legs	7625	5 ½ min.	
F.S. No. 2 Does A Ruler Have Two Feet?	7626	6½	
F.S. No. 3 River Horses and Dandelions	7627	9	
F.S. No. 4 Circles, Cycles and Cymbals	7628	9½	
F.S. No. 5 Big, Large, Colossal	7629	6	
F.S. No. 6 Little, Tiny, Teeny	7630	7	

Grade Level: Grades 3-6, remedial for Junior High

Subject Areas of Use: Language Arts

Collaborator & Background Information: Dr. Charles M. Brown, Professor of Education, University of Southern California is the consultant and author of the program. He is the co-author of a developmental reading series TARGET TODAY, published by Benefic Press, 1973.

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MORE ROADS TO MEANING

6 Sound Filmstrip Series
(Vocabulary Development)

Synopsis:

Emphasis of the six sound filmstrip series is vocabulary acquisition and English language development. There are three strands (categories) of vocabulary study: multi-meaning words; etymology (the source, history and derivation of words); and synonyms (words having the same or almost the same meaning).

Multi-meaning Words	Etymology
F.S. 1 Tables Without Legs	F.S. 3 River Horses and Dandelions
F.S. 2 Does A Ruler Have Two Feet?	F.S. 4 Circles, Cycles and Cymbals

Synonyms

F.S. 5 Big, Large, Colossal

F.S. 6 Little, Tiny, Teeny

Goals (General Educational Goals):

I. Growth in knowledge about words and language

II. Development of an active interest in words and language

III. Increase in skills in the use of words and language

Specific Objectives:

1. To increase students' vocabulary understanding
2. To increase students' understanding of word meanings
3. To improve students' reading comprehension as it is related to vocabulary meanings
4. To develop students' awareness of the multiple meanings of many English language words.
5. To create active interest in language and vocabulary
6. To sensitize students to the "shades of meaning" which the use of different words make possible.

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7. To develop a broad understanding that language is dynamic and constantly changing
8. To become aware that the purpose of language is communication
9. To acquire factual knowledge of word meanings of the specific vocabulary presented
10. To recognize that the word study of the vocabulary in More Roads to Meaning is only a sample model of our language
11. To initiate from the word study in the filmstrip series an exploration of the realm of vocabulary
12. To facilitate students' receptive and expressive language abilities:
    a. increased comprehension in reading
    b. wider range of oral language expression
    c. more precise and interesting written language expression

Presentation Approach:

The sound filmstrips present short audiovisual vignettes, brief episodes of language situations, thus presenting vocabulary in contextual settings. The vignettes are often humorous and real life situations to which students readily relate. The filmstrip visuals are original art rendered by an outstanding contemporary artist. Word meanings are enhanced not only through language situations but with audio narration, sound effects and music.

Features:

The sound filmstrips of More Roads to Meaning encourage active participation on the part of viewers - the development of "meaning" is sequenced from simple, known vocabulary such as "big," "see," or "tired" to more sophisticated terms such as "colossal," "view," and "fatigued." The "core" vocabulary for the series was checked to Harris and Jacobsen Basic Elementary Reading Vocabularies, Macmillan Co. 1972. Most of the base words are third grade or below.

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Target Audience:

Students of all ages (Elementary, Jr. High (remedial) and High School (remedial) whose reading achievement level is approximately third grade or above.

The lessons have been structured in "non-age" contextual settings - i.e. equally appealing to the eight year old or the sixteen year old.

Benefits:

The vocabulary development approach with emphasis on communication, word meanings and use provides excellent language acquisition lessons for students for whom English is a second language.

Beyond the decoding process in reading, vocabulary understanding plays an important part in reading comprehension. Thus, introduction to new vocabulary in contextual settings of story episodes increases the opportunity to understand through almost direct experience. (The film-sound presentation is the closest to real life episodes.)

Correlation to Curriculum:

The "base words" (the initial models selected) in each filmstrip are primary vocabulary words such as: fall, run, good, big, little, etc. Thus students begin each new learning experience with familiar, known vocabulary. Ranging from the base word, new related words or synonyms are in graduated levels of difficulty - for example: base word "thin" is developed to "skinny," "slim," and "slender;" and base word "see" is developed through "glimpse," "notice," and "observe." The presentation of a variety of difficulty levels allows the instructional material to be suitable for a variety of levels of learners - More Roads to Meaning has a range of learning opportunities.

Student Activity Sheets:

For each sound filmstrip lesson there are two ditto student activity sheets. The ditto lesson material provides application lessons for student independent study. The

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lesson activity sheets review and reinforce the specific vocabulary introduced in the corresponding filmstrip.

Teacher's Guide:

A comprehensive detailed teacher's guide is provided for the total set. Individual lesson presentations are offered for each filmstrip. Related additional activities are offered. Correlation to exemplary lessons in basal reading and language arts textbooks are documented. Correspondence to lessons in Laidlaw, American Book, and Ginn are paginated to both the student textbook and the teacher's guide.

Trial Testing:

The trial test report is available on request. 252 elementary students (grades 3 and 6) of low-middle s.e.s. were used. A high percentage of these students were those for whom English is a second language. Students improved at least 25% on a criterion referenced post-test.

Interest was evidenced by students requesting more lessons after testing was completed. Teachers rated the presentations as excellent. Older students were equally attentive to the filmstrip lessons as the younger students.

As a result of the trial testing, corrections were made in the narrations and time-pacing adjusted.

Comments:

It is not possible to present all possible vocabulary which students use in reading and language - thus this filmstrip series is not considered a comprehensive study of words, their meanings and uses. Rather, this series is an introduction to certain characteristics of the vocabulary of English words. It is intended to promote curiosity, interest, and continued exploration into the fascinating world of communication.

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MORE ROADS TO MEANING

Trial Test

The sound filmstrips of MORE ROADS TO MEANING were tried with students in the Los Angeles City School District, November, 1974. The test site school is located in the area just north of California State University, Los Angeles, where the population is predominantly of Mexican-American extraction. The socio-economic level of this Title I school is lower middle.

A total of 159 third grade pupils in six classrooms and 93 sixth grade pupils in three classrooms were involved. Each third grade class viewed one filmstrip and took the related pre- and post-tests. Each sixth grade class viewed two filmstrips and took the related tests. The teachers administered the pre-tests. The consultant presented the filmstrips and helped the teachers in the administration of the post-tests.

The results were highly satisfactory. The pupils seemed uniformly interested and motivated. The students and their teachers were enthusiastic and wanted to use the other filmstrips of the series which they did not have a chance to enjoy during trial testing. The technical corrections needed in the tape were noted and corrected. The revisions needed in the follow-up lessons were documented and student activity sheets were redesigned on the basis of student responses.

The mean results for each item on each lesson are documented on the attached chart. This is shown as total number of pupils marking each item correctly for third grade pre-test; third grade post-test; sixth grade pre-test; and sixth grade post-test. Following each of the sets of figures is the percentage of students getting the item correct.

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The percentage figures were then averaged in order to get a general idea of average response to the total lesson by each test class, both pre- and post-test. These figures have been transferred to the summary table. The mean percentage of correct responses was then averaged to yield an idea of the total average difficulty of the lessons.

Observation of the summary table shows that a typical item was answered correctly by 41.4% of the third graders on the pre-test and by 62.8% of those same third graders on the post-test. All factors considered, the difficulty level and the instructional value of the materials seem to be about right.

Corresponding figures for the sixth graders are 66.9% and 88.4% on the pre- and post-tests respectively. These figures together with the interest shown by both the sixth grade pupils and their teachers indicates that these materials can be used from the third through the sixth grades.

Caution should be exercised in interpreting the trial test scores. No statistical test of significance was attempted. Comparing percentages in the manner used yields "eyeball" data, which indicates the degree of success of the particular students in the trial test.

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SUMMARY TABLE

THIRD GRADE

MORE ROADS TO MEANING

	Pre-test	Post-test	Difference
Tables Without Legs, F.S. 1, Lesson #1 N=	27	25	-
Mean Correct Responses	56%	72%	16
Tables Without Legs, F.S. 1, Lesson #2 N=	26	25	-
Mean Correct Responses	58%	70%	12
Does A Ruler Have Two Feet? F.S. 2, Lesson #1 N=	23	25	-
Mean Correct Responses	44%	67%	23
Does A Ruler Have Two Feet? F.S. 2, Lesson #2 N=	23	25	-
Mean Correct Responses	37%	64%	27
River Horses and Dandelions F.S. 3, Lesson #1 N=	26	27	-
Mean Correct Responses	29%	42%	13
River Horses and Dandelions F.S. 3, Lesson #2 N=	27	27	-
Mean Correct Responses	37%	53%	16
Circles, Cycles and Cymbals F.S. 4, Lesson #1 N=	28	28	-
Mean Correct Responses	24%	61%	37
Circles, Cycles and Cymbals F.S. 4, Lesson #2 N=	28	28	-
Mean Correct Responses	32%	53%	21
Big, Large, Colossal, F.S. 5, Lesson #1 N=	22	26	-
Mean Correct Responses	25%	52%	27
Big, Large, Colossal, F.S. 5, Lesson #2 N=	27	25	-
Mean Correct Responses	67%	71%	4
Little, Tiny, Teeny, F.S. 6, Lesson #1 N=	25	25	-
Mean Correct Responses	36%	69%	33
Little, Tiny, Teeny, F.S. 6, Lesson #2 N=	25	25	-
Mean Correct Responses	53%	80%	27
Mean Percentages	41.5	62.8	21.3

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SUMMARY TABLE
SIXTH GRADE
MORE ROADS TO MEANING

		Pre-test	Post-test	Difference
Tables Without Legs, F.S. 1, Lesson #1	N=	32	31	-
Mean Correct Responses		96%	97%	1
Tables Without Legs, F.S. 1, Lesson #2	N=	32	31	-
Mean Correct Responses		82%	95%	13
Does A Ruler Have Two Feet? F.S. 2, Lesson #1	N=	31	32	-
Mean Correct Responses		77%	94%	17
Does A Ruler Have Two Feet? F.S. 2, Lesson #2	N=	31	32	-
Mean Correct Responses		60%	92%	32
River Horses and Dandelions F.S. 3, Lesson #1	N=	32	29	-
Mean Correct Responses		50%	89%	39
River Horses and Dandelions F.S. 3, Lesson #2	N=	32	28	-
Mean Correct Responses		62%	75%	13
Circles, Cycles and Cymbals F.S. 4, Lesson #1	N=	29	29	-
Mean Correct Responses		45%	89%	44
Circles, Cycles and Cymbals F.S. 4, Lesson #2	N=	29	29	-
Mean Correct Responses		38%	76%	38
Big, Large, Colossal, F.S. 5, Lesson #1	N=	31	31	-
Mean Correct Responses		59%	72%	13
Big, Large, Colossal, F.S. 5, Lesson #2	N=	31	30	-
Mean Correct Responses		78%	95%	17
Little, Tiny, Teeny, F.S. 6, Lesson #1	N=	29	29	-
Mean Correct Responses		76%	88%	12
Little, Tiny, Teeny, F.S. 6, Lesson #2	N=	29	29	-
Mean Correct Responses		80%	99%	19
Mean Percentages		66.9	88.4	21.5

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